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## SYNOPSIS

OF THE

# GEOLOGY OF MONTREAL

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## THE GEOLOGY OF MONTREAL.

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Fourteen distinct geological formations or horizons have been described within a radius of a few miles from Montreal. Four of these belong to the Quaternary or newest system, one is doubtfully but probably referable to the Devonian, one to the Silurian (Upper Silurian of Murchison), seven to the Ordovician (Lower Silurian and Cambro-Silurian of many authors), and the remainder to the Laurentian or part of the great Archæan Complex.

A geological map of Montreal and its environs would comprise four areas marked by four distinct orographic features worthy of note, as follows:

- (1) A more or less hilly and mountainous plateau of Archæan rocks to the north and north-west of Montreal.
- (2) A broad, flat, more or less elevated Ordovician plain.
- (3) A number of conspicuous, more or less elevated conical mountains or hills of volcanic origin rising through the Ordovician plain.
- (4) Alluvium, marine clays and sands, gravel terraces and raised beaches accompanied by "till" and numerous phenomena characteristic of the "Great Ice Age."

SUMMARY OF THE VARIOUS GEOLOGICAL FORMATIONS IN  
AND AROUND MONTREAL, CANADA, AND SOME OF  
THEIR MORE SALIENT CHARACTERS.

PLEISTOCENE.

Exclusive of the fresh-water, lake and river deposits of more recent times, the Pleistocene formations, in descending order, consist of the following :

I. SAXICAVA SAND FORMATION, of Eastern Canada. Characteristic fossils : *Saxicava rugosa*, *Mya arenaria*, *M. truncata*, *Macoma fragilis*.

II. LEDA CLAY FORMATION, marine clays with occasional sandy partings; foraminiferal. Fossils : *Leda (Portlandia) arctica*, *Craniella Logani*, *Ophioglypha Sarsii*, *Polystomella crispa*, etc.

III. GLACIAL OR BOULDER CLAYS, TILL. No fossil remains have as yet been found in the glacial clays of Montreal.

*Localities* : St. Louis and Mile-End Quarries, the Tanneries, etc., are excellent collecting grounds for Pleistocene fossils.

DEVONIAN.

DEVONIAN ERUPTIVES, ETC. To the Devonian Epoch are ascribed those nepheline syenite masses, diabase, and trachyte, and other dyke rocks, which are so conspicuous and numerous about Montreal, holding Dawsonite, sodalite, elæolite-syenite, etc. The eruptive masses comprise Mount Royal, Belœil, Montarville, Rougemont, Mount Johnson, etc.

An occasional pebble of fossiliferous Middle Devonian limestone marks the probable existence, at one time, of a basin of Devonian rocks in the Montreal district, similar to those which are known to exist farther east along the Famine River, and in

the Gaspé Peninsula of Quebec, or to the south in the Helderberg mountains of New York State. Such Devonian pebbles occur in the volcanic agglomerates or breccias of St. Helen's Island, just south of Montreal.

#### SILURIAN.

LOWER HELDERBERG FORMATION. Consists of somewhat limited patches of light gray and compact more or less altered limestones which abound in fossil remains, chiefly Brachiopoda. Fossils: *Favosites Gothlandicus*, *Leptaena rhomboidalis*, *Orthis eminens*, *Stropheodonta varistriata*, *S. punctulifera*, *Pentamerus galeatus*, *Spirifer concinnus*, *S. cyclopterus*, *Atrypa reticularis*, *Stenoschisma formosum*, *Platyostoma depresso*. Locality: South side of St. Helen's Island.

#### ORDOVICIAN.

The Ordovician (Cambro-Silurian and Lower Silurian) formations in the Montreal district are seven in number, and from the Lorraine or uppermost Ordovician in Canada, down to the Potsdam sandstone there is not a single break in the succession. From Ste. Anne, a point twenty miles west of Montreal, to Chambly, there is a complete section and series of these seven formations in descending order as follows:

I. LORRAINE ("Hudson River" of many geologists). Consists of dark brown and black, brittle, for the most part indurated clay and arenaceous shales and sandstones. Fossils: *Columnaria alveolata*, *Catazyga Headi*, *Pterinea demissa*, *Byssonychia radiata*, *Orthograptus quadrimucronatus*, *Clidophorus planulatus*, *Orthodesma parallelum*, *Cyrtolites ornatus*. Localities: Chambly, Rougemont, Rivière-des-Hurons, Belœil.

II. UTICA FORMATION. Dark brown and black, brittle and bituminous shales with occasional bands of limestone at the base. Fossils: *Reteograptus* (?) *eucharis*, *Leptograptus flaccidus*, *Leptobolus insignis*, *Schizocrania filosa*, *Cornultites immaturum*, *Trocholites ammonius*, *Triarthrus Becki*. Localities: St. Helen's Island, West End, Point St. Charles, near Victoria Bridge.

III. TRENTON FORMATION. Dark gray fossiliferous limestone and shales. Fossils: *Glyptocystites Logani*, *Heterocrinus tenuis*, *Pachydictya acuta*, *Plectambonites sericea*, *Prasopora Selwyni*, *Dalmanella testudinaria*, *Parastrophia hemiplicata*, *Rafinesquina alternata*, *Trematis Montrealensis*, *T. terminalis*, *Glossina riciniformis*, *Rhynchotrema inequivalevis*, *Cyclonema Montrealense*, *Bellerophon bilobatus*, *Conularia Trentonensis*, *Trochonema umbilicatum*, *Isotelus gigas*, *Calymena senaria*. Localities: Mile-End and St. Louis quarries, Lachine, Pointe-aux-Trembles, Hochelaga.

IV. BIRD'S EYE AND BLACK RIVER FORMATION. Dark gray impure fossiliferous limestones. Blocks of this limestone were used in constructing the piers of the Victoria Tubular Bridge. Fossils: *Tetradium fibratum*, *Columnaria Halli*, *Solenopora compacta*, *Stromatocerium rugosum*, *Helicotoma planulata*, *Cyrtodonta Huronensis*, *Bathyurus extans*. Localities: Pointe-Claire, St. Vincent-de-Paul.

V. CHAZY FORMATION. Light and dark gray fossiliferous limestones. Fossils: *Bolboporites Americanus*, *Malocystites Murchisoni*, *Blastoidocrinus carchariedens*, *Rhynchotrema plena*, *Lingula Belli*, *Orthis*, (*Hebertella*) *borealis*, *O. imperator*, *Bathyurus Angelini*. Localities: Sault - au - Récollet, Back Mountain, St. Martin, Terrebonne, Caughnawaga. Excellent building stone.

VI. CALCIFEROUS FORMATION. Dark gray, impure, more or less magnesian and arenaceous, fossiliferous limestone. Fossils : *Pleurotomaria calcifera*, *P. Canadensis*, *Orthisina grandeva*, *Ophileta complanata*, *O. disjuncta*, *Hormotoma Anna*, *Metoptoma simplex*, *Orthoceras Lamarcki*, *Amphion Salteri*, *Bathyurus Cybele*, *Ribeira calcifera*, *Leperditia Anna*. Localities : Ste. Anne, Caughnawaga, Carillon.

VII. POTSDAM (SANDSTONE) FORMATION. Light yellow, rusty-weathering sandstones. Fossil remains : *Scolithus Canadensis*, *Protichnites multinotatus*, *P. lineatus*, *P. octonotatus*, *P. septemnotatus*. Localities : Beauharnois, for tracks ; Ste. Anne, for *Scolithus*.

#### ARCHÆAN.

LAURENTIAN. The "Morin area," north of Montreal, has been recently described by Dr. Adams, and forms a part of that extensive series of granites and granitoid gneisses, limestones and anorthosites so extensively developed everywhere in North-Eastern Canada, covering as they do an area of more than two million square miles.

For a more detailed account of the geology of Montreal and its environs, the reader is referred to volume VII of the "Annual Report of the Geological Survey of Canada," 1896, in which Dr. Ells, Dr. Adams and the writer present the leading geological features in the stratigraphy, petrography, and palæontology respectively. The "Geology of Canada," 1863, by Sir Wm. Logan, E. Billings, Sterry Hunt, etc., also contains excellent details on the same district, besides other districts of Ontario and Quebec.